

Activated, Coal-Based Carbon Foam

Field of the Invention

5 The present invention relates to coal-based carbon foams and more particularly to activated such foams that provide porous, monolithic and structurally sound activated carbon materials for filtration applications.

Background of the Invention

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 Activated carbon and filters made therewith are well known in the art. Such filters conventionally comprise masses of activated carbon particulate that is loaded into a permeable frame with the combination of the permeable frame and the contained activated carbon particulate serving as the filtering medium. Alternative
15 similar structures using gell forms of activated carbon are also well known. While such arrangements are entirely satisfactory for many applications and provide entirely satisfactory filtering of fluids, especially gases, their use is often cumbersome or expensive due to the requirement that the activated carbon
20 particulate must be loaded into some kind of permeable frame or container to obtain the desired filter element. Additionally, since carbon particles are, by their very physical nature, "dirty" and dusty, i. e. friable and not particularly durable, the handling thereof for purposes of loading the filter element is at best inconvenient

and time consuming and at worst dangerous and costly. This is particularly true in the case of smaller filter elements that require changing of the filter medium only occasionally, such as in the case of furnace filters for the home and the like.

5 Thus, the availability of a monolithic activated carbon filter material that provides all of the advantages of an activated carbon particulate filter, but does not require the handling of particulate carbon to obtain these advantages would be highly desirable. Such an activated carbon material available as a monolithic pre-sized element that can easily inserted into a duct or other fluid conduit would be
10 highly useful.

Object of the Invention

It is therefore an object of the present invention to provide a monolithic,
15 activated carbon foam that can replace prior art activated carbon particulate filters that require the handling of ablative carbon particulate or gels.

Summary of the Invention

20 According to the present invention, there is provided an ablation resistant, monolithic, activated, carbon foam produced by the activation of a coal-based carbon foam through the action of carbon dioxide, ozone or some similar oxidative agent that pits and/or partially oxidizes the carbon foam skeleton, thereby

significantly increasing its overall surface area and concurrently increasing its filtering ability. Such activated carbon foams are suitable for application in virtually all areas where particulate or gel form activated carbon materials have been used. Such an activated carbon foam can be fabricated, i. e. sawed, machined and otherwise shaped to fit virtually any required filtering location by simple insertion and without the need for handling the “dirty” and dusty particulate activated carbon foam materials of the prior art.

Description of the Drawings

Figure 1 is a graph showing the heat treatment temperatures for the various phases of the production process used in the fabrication of the activated carbon foam of the present invention.

Detailed Description

U.S. Patent Application Serial Number 09/453,729 filed December 2, 1999 and entitled, “Coal-Based Carbon Foams”, which is incorporated herein by reference in its entirety, describes a family of carbon foams having a density of preferably between about 0.1 g/cm^3 and about 0.8 g/cm^3 that are produced by the controlled heating of coal particulate preferably up to $\frac{1}{4}$ inch in diameter in a “mold” and under a non-oxidizing atmosphere. The process described in this application comprises: 1) heating a coal particulate of preferably small i.e., less than